

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS RELATING TO TRANSFER PRINTING

(71) We, STOREY BROTHERS AND COMPANY LIMITED, a British Company, of White Cross, Lancaster LA1 4XH, England, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the dye transfer printing process and in particular to printed supports or carriers for transfer printing.

The dye transfer process is well known and described for example in British Patent Specifications Nos. 951987, 1,052,625, 1,189,026, 1,190,889, 1,221,126, 1,227,271, 1,243,223 and 1,127,372 Canadian Patent Specification No. 760915 and in pages 126 to 131 of No. 71 of Teinture et Appreties, August 1962.

The process consists of placing a support or carrier coated with a sublimable dye or dyes in face to face contact with the material to be dyed, for example a textile material, and heating the support or carrier so that the dye sublimates from it and deposits on the material. The heating can, for example, be effected using an iron or by passing the carrier and material to be dyed between rollers, the one which is in contact with the carrier being heated. In some circumstances it may be desirable to carry out the sublimation under reduced pressure, for example to obtain more even sublimation or an improved fastness with some dyes.

The carrier or support may be any backing material able to withstand the heat of the transfer process which is normally from 80 to 300°C, and on which the dyes may be successfully coated e.g. by printing. The most common carrier is paper because of its cheapness and the dyes are normally printed on this paper by means of a printing ink containing the sublimable dye or dyes in the form of a pattern which is transferred to the material to be dyed.

The dye or dyes should be readily sublimable and should normally sublime at a temperature in the range 80 to 300°C. The dyes may be fibre reactive or non-fibre re-

active with the fibres of the material being dyed.

Usually the printing ink which is applied to the support or carrier is in the form of a solution or dispersion of the dye together with a binder in a solvent such as a spirit solvent. The binder if present should not sublime or transfer across to the material being dyed and for this reason it should have a softening point above that at which the dye transfer is effected. The particular binders and dyes which are usually present in the printing inks are fully exemplified in the above list of documents to which reference is made.

The preparation of printed supports using paper suffers from certain defects arising from the transfer of the ink from the face to the back of the transfer papers whilst they are rolled up or placed on top of each other after printing. These defects are known as "pick-off" or "set-off" when the ink is bodily transferred from the face of one layer to the back of the next layer of the supports and as "mark-off" when the pigment only has transferred, presumably by sublimation.

The result of these defects is not only the tendency for the printed patterns to be slightly smudged but also that since the paper support is permeable to the dye vapour the dye on the back of the printed support migrates through the paper during the transfer process and is deposited on the material being dyed together with the dye pattern causing unwanted patches of colour on the dyed material.

It is an object of the present invention to minimise these problems.

According to the invention there is provided a printed support suitable for use in the dye transfer process comprising a paper support on one surface of which has been applied a dye pattern of a sublimable dye or dyes and on the other surface of which has been applied a lacquer which reduces the permeability of that surface of the paper support to the diffusion of sublimed dyes. This lacquer can also render the surface of the paper support non-adherent and/

or non-receptive to the sublimable dye or dyes.

We have found that the printed supports of the invention overcome the problems of set-off and mark-off and prevent the unwanted patches of colour on the dyed material. Furthermore, the presence of the lacquer on the back of the transfer sheet greatly reduces the tendency of the sheet to curl. This factor is of significant importance when individual items, such as blouses and skirts, are being transfer dyed, as it is much easier to position a flat piece of paper than one which is curling up. It is believed that the resistance to curling is achieved since the position of the lacquer on the back of the sheet acts as a balancing layer.

The lacquers suitable for the invention must be relatively impermeable to the dye vapour. Preferably they are non-adherent and/or non-receptive to the dyes and binders of the dye pattern. Preferably when coated on the paper support the lacquers render the surface of the paper substantially impermeable and non-adherent and/or non-receptive to the dyes. In this way set-off is substantially reduced and if any set-off occurs this will not effect the dyeing of the material since the dye will not be able to migrate rapidly through the support. The problem of mark-off is also prevented in the same way.

Suitable lacquers may be based on casein, gelatin, carboxymethyl cellulose or combinations of these and may contain silicones or other materials to enhance the non-adhesive properties of the dried lacquer.

The lacquer may be applied to the paper support before or after printing the dye pattern by means such as rolling or spraying or by other means such as a doctor blade or air knife. For example, a "back-lacquering" roller may be positioned before or after the printing roller so that the lacquer is applied to the back of the support. The lacquering may also be a separate operation to the printing.

The lacquers may be applied in the form of a solution in a suitable solvent such as water, or as an emulsion in water. The lacquers are generally applied to give a dry coating weight in the range 0.5 to 50 grams per square metre and preferably in the range 5 to 10 grams per square metre.

A lacquer of the following formulation was prepared:

Carboxymethyl cellulose (Cellofas B5)	800 g	
Silicone M421 Emulsion	16 g	
Water	10 litres	60

Cellofas B5 and Silicone M421 are commercially available from I.C.I.

The lacquer was applied at the rate of from 60 to 70 grams per square metre, to give a dry coating weight of approximately 5 grams per square metre.

The word "Cellofas" is a registered Trade Mark.

#### WHAT WE CLAIM IS:—

1. A printed support suitable for use in the dye transfer process comprising a paper support on one surface of which has been applied a dye pattern of a sublimable dye or dyes and on the other surface of which has been applied a lacquer which reduces the permeability of that surface of the paper support to the diffusion of sublimed dyes.
2. A printed support as claimed in Claim 1 in which the lacquer renders that surface of the paper support to which it is applied non-adherent and/or non-receptive to the sublimable dye or dyes.
3. A printed support as claimed in Claim 1 or Claim 2 in which the lacquer is based on casein, gelatin, carboxymethyl cellulose or any combination thereof.
4. A printed support as claimed in any preceding claim in which the lacquer additionally contains a silicone.
5. A printed support as claimed in any preceding claim in which the lacquer has been applied in an amount in the range of from 0.5 to 50 grams per square metre.
6. A printed support as claimed in Claim 5 in which the lacquer has been applied in an amount in the range of from 5 to 10 grams per square metre.
7. A printed support according to claim 1 for use in the dye transfer process substantially as herein described.

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